

Myocardial oxidative metabolism in normal subjects in fasting, glucose loading and dobutamine infusion states

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Experimental studies indicated the clearance rate constant of ^{11}C -acetate as an index of regional myocardial oxygen consumption. To assess the response of the clearance rate from the left ventricular (LV) myocardium to the change in plasma substrate levels and to the increase in the cardiac work load in normal subjects, a total of 18 dynamic positron emission tomographic studies were performed at rest in the fasting state (control) ($n=7$), after oral glucose administration ($n=4$), and during dobutamine infusion ($n=7$) in 7 normal volunteers. The clearance rate constant (K_{mono}) was similar in the control ($0.065 \pm 0.017 \text{ min}^{-1}$) and glucose loading states ($0.059 \pm 0.008 \text{ min}^{-1}$), whereas a significant increase in K_{mono} was observed during dobutamine infusion ($0.106 \pm 0.018 \text{ min}^{-1}$) ($p < 0.01$) in relation to the increase in the pressure-rate product with a correlation coefficient of 0.873 ($p < 0.01$). When the LV myocardium was divided into 6 segments, there were no significant differences among the segments in K_{mono} values in any condition. These normal responses should be valuable for assessing oxidative metabolic reserve and regional changes in oxidative metabolism in patients with coronary artery disease.

Key words: Positron emission tomography, ^{11}C -acetate, myocardial metabolism, dobutamine, oxygen consumption